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# IOT Based Coal Mine Monitoring System Using LoRa Cloud

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**ABSTRACT:** In this project proposes a design of a wireless sensor network (WSN) with the help of Arduino UNO controller can monitor the temperature, humidity, gas, and status of smoke in an underground mine. This system utilizes low power, cost-effective Arduino Uno, temperature sensor, humidity sensor, smoke detector, and a gas sensor for sensing the mine climate parameters and Lora for remote logging of data at a central location to control the climate state. Conventional coal mine monitoring system is wired network systems, which play an essential role in coal mine safe production. With continuous Expansion and depth of exploitation areas in a coal mine become multiple lanes. Blind areas, with lots of hidden dangers. Moreover, it is inconvenient to lay expensive cables and consumes time. To solve the problems, we will design a coal mine safety monitoring system based on a WSN. All the sensors values are uploaded to thing speak cloud.

**KEYWORDS:** IOT, LoRa.

## I. INTRODUCTION

The process of Underground mining operation through human laborers could be an extremely unsafe state of affairs wherever the risks increase with the rise in distance from the bottom. The mining operations with unsafe manners square measure because of completely different methodologies used by the miners for extricating various minerals. The longer the mine, the lot outstanding is that the hazard. the security measures execution is incredibly poor, especially in the mine industries. Coal is an important resource to every nation because it has several business applications. The most integral employments of coal are within the production of thermal power, cement, and production and as a fuel for numerous applications. The coal mines have various risky stipulations that embrace warmth and humidness and discharge harmful gases that build unsafe surroundings for specialists operating there. several workers are initiating their occupations in coal mines or not in any respect inclined to pick such employments as mining. This creates loads of challenges within the accessibility of workers for the coal mining trade. the protection of laborers operating in coal pit industries is growing day by day through technologies. The progressive innovation that permits the mine watching methods to become a lot of refined, however, explosions in underground coalpit still happen. The accidents of calamities in coal mines are primarily because by the toughening environments and unsafe operating conditions. This makes the need of using mine checking systems at a high level for coal mines. it's quite laborious to research all the environmental conditions perpetually during a coal pit manually. This job will be effortlessly achieved with the assistance of economically viable wireless communication devices utilized at the specified position in coal mines. The projected model uses less power and economical sensors are utilized to sense the heartbeat, metabolic process level of an employee, and any venturous gases free in the surroundings on an oversized scale.

## II. RELATED WORK

[1], the authors have present a paper on the Experimental Research On Radar Remote Sensing Monitoring of Coal Mining Subsidence in Loss Mining Area. The Loss covered areas include Shanxi, Shaanxi, Ningxia, Gansu and other provinces and is the main coal production base. The Loss Plateau is characterized by varied topography, complicated geological and geomorphic conditions and large thickness of mining coal seam, which results in many types of geological hazards, wide distribution and great threat. Therefore, it is very necessary to monitor the surface deformation by full coverage and all-weather monitoring. The vertical deformation information with high accuracy can be obtained

by using D-InSAR technology. The Technique is Sentinel1A satellite; D-InSAR technology; Loss Plateau mining area. the future scope is Through field investigation, it is found that the settlement range and subsidence trend of the mining area are consistent with the actual situation. drawback of this project is This was done as we do not have access to the VHF 156.6 MHz maritime frequency band as this is a licensed band.

In [2], the authors have present a paper on Remote sensing monitoring of surface vegetation and soil moisture changes and the disturbance effect of coal mining subsidence in the Western mining area of China. In order to explore the disturbance effect of mining subsidence on the vegetation and soil moisture in mining area, using the remote sensing data of the 2007-2017 years in Shaanxi Bin Chang mining area, this paper builds the Temperature Vegetation Drought Index model by establishing the characteristic space, and the changes of vegetation and soil moisture in the mining subsidence area and no-mining affected area were monitored and analysed. According to the subsidence range and damage degree during the 2007-2017 years in the study area, the depth of crack and the area of crack area in the mining subsidence area are determined, and the disturbance effect of soil moisture change caused by mining subsidence is discussed.

In [3], the authors have present a paper on Real Time Monitoring & Analyzation Of Hazardous Parameters In Underground Coal Mines Using Intelligent Helmet System. Coal mining has always been a necessary evil. We need the coal for various operations, especially electrical power generation. However mining the coal has proven to be very dangerous and has caused many accidental deaths over the years. Keeping this in mind we have designed an intelligent

### **III. PROPOSED ALGORITHM**

1. LORA Technologies based communication
2. In this system sensors detecting the parameters every time, when there is any sudden change in any of the parameter it gets reported via LORA 3. All necessary parameters are monitored through sensors.
4. All the sensors values are uploaded to cloud.

#### **A. ADVANTAGES**

1. Wide range of communication is available
2. Easy connectivity between modules
3. Easy to implement in real time.
4. The crucial parameters from inside the mine can be monitored from by the supervisors and manager using the remotely.

### **IV. RESULT**

Create a new channel in Thing Speak Cloud.

In the new channel, there are four areas of temperature nomenclature, Humidity, gas, pulse. In Thing Speak cloud there will be two API keys namely read and right key. We need to copy the right API key which is 12-digit and paste that into the receiver code. In order to set the threshold limit we need to click on apps section and select the react and set the value. To connect the push bullet app to cloud we need to copy the API key of it and paste it in the http section of cloud. To receive the alert message we need to set the settings accordingly. Then the results below are displayed.



FIG 1: KIT

## V. CONCLUSION AND FUTURE WORK

The coal mine monitoring system is carried out utilizing smoke sensors, DHT11 sensors, and heartbeat sensors for acquiring furthermore, well being boundaries within natural circumstances. A savvy alert framework is executed for the well-being of excavators by making them with impeccable timing aware of getaway from the mining climate in the event of any mishaps. This framework continually notices the coalmine and cautions the laborer and the approved individual starting from the earliest stage by utilizing LoRaWAN innovation. The climate and wellbeing status of the mine workers have persistently refreshed in the Thing Speak cloud. The framework is savvy and productive with which the clinical information of the excavator is gotten and utilized for additional fake knowledge-based clinical visualization. Thus the proposed framework decreases the demise rate and infection alarms for the laborers in the mining business.

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